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Three new cave-dwelling species of *Tyrannochthonius* Chamberlin, 1929 (Pseudoscorpiones, Chthoniidae) from Guangxi, China

Jianzhou Sun[1,2], Xiangbo Guo[1,2], Feng Zhang[1,2]

1 *Key Laboratory of Zoological Systematics and Application, College of Life Sciences, Hebei University, Baoding, Hebei 071002, China* **2** *Hebei Basic Science Center for Biotic Interaction, Hebei University, Baoding, Hebei 071002, China*

Corresponding author: Feng Zhang (dudu06042001@163.com)

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Abstract

Three new *Tyrannochthonius* species are described, including detailed diagnosis and illustrations: *T. rudongyanensis* **sp. nov.**, *T. tiani* **sp. nov.**, and *T. yanwuensis* **sp. nov.** All samples were collected from the hypogean habitats in Guangxi, China. A distribution map of all *Tyrannochthonius* species in Guangxi is provided.

Keywords

Diversity, karst, morphology, taxonomy

Introduction

The Southwest China Karst region, spanning eight provinces in southwestern China and centred around the Yunnan-Guizhou Plateau and the southern hilly regions (Wang et al. 2019), is a hotspot for pseudoscorpion diversity. The first cave-dwelling pseudoscorpion species in China was described by Schawaller (1995), with only a few cave-dwelling pseudoscorpion species having been reported sporadically in the preceding years (Mahnert 2009; Mahnert and Li 2016; Gao et al. 2018, 2020). In recent years, the diversity of cave-dwelling pseudoscorpions in China has received unprecedented

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attention, with the number of species showing an explosive growth trend (Li 2022; Hou et al. 2022, 2023a, 2023b; Feng et al. 2023; Sun et al. 2024; WPC 2025).

The genus *Tyrannochthonius* Chamberlin, 1929, belonging to the family Chthoniidae Daday, 1889, subfamily Chthoniinae Daday, 1889, and tribe Tyrannochthoniini Chamberlin, 1962, is a relatively common pseudoscorpion taxon living in caves in the Southwest China Karst region. A total of 42 *Tyrannochthonius* species have been recorded in China (including a subspecies), 38 of which are cave-dwelling species collected from caves in the Southwest China Karst region (WPC 2025). Among these 38 cave-dwelling species, 27 were from Guizhou (Gao et al. 2020; Li 2022; Hou et al. 2023a), while only one species, *Tyrannochthonius chixingi* Gao, Wynne & Zhang, 2018, is found in Guangxi (Gao et al. 2018).

This study describes three new cave-dwelling *Tyrannochthonius* species, based on specimens collected from caves in Guangxi by Prof. Mingyi Tian (South China Agricultural University, Guangdong Province) and our laboratory members. Detailed descriptions, illustrations, and a distribution map (Fig. 1) of these new species are provided.

Materials and methods

Specimen preparation and examination

The specimens examined for this study were preserved in 75% ethyl alcohol in a refrigerator at -20 °C and deposited in the Museum of Hebei University (MHBU) (Baoding, China). Photographs and measurements were obtained using a Leica M205A stereomicroscope equipped with a Leica DFC550 camera. Drawings were made using the Inkscape software (Ver. 1.0.2.0). Detailed examination was carried out using an Olympus BX53 general optical microscope. All images were edited and formatted using the Adobe Photoshop 2017 software.

Terminology

Terminology and measurements followed Chamberlin (1931) with some small modifications to the terminology of trichobothria (Harvey 1992; Judson 2007) and chelicera (Judson 2007). The chela and legs were measured in the lateral view and the others were taken in the dorsal view. The measurements of the specimens were predominantly provided in millimeters (mm) unless specified otherwise, whereas the measurements on the map were presented in kilometers (km). Proportions and measurements of chelicerae, carapace, and pedipalps correspond to length/breadth, and those of legs to length/depth.

The following abbreviations were used in the text: for chelal trichobothria: ***b*** = basal; ***sb*** = sub-basal; ***st*** = subterminal; ***t*** = terminal; ***ib*** = interior basal; ***isb*** = interior sub-basal; ***ist*** = interior sub-terminal; ***it*** = interior terminal; ***eb*** = exterior basal; ***esb*** = exterior sub-basal; ***est*** = exterior sub-terminal; ***et*** = exterior terminal. For other abbreviations: ***dx***, duplex trichobothria.

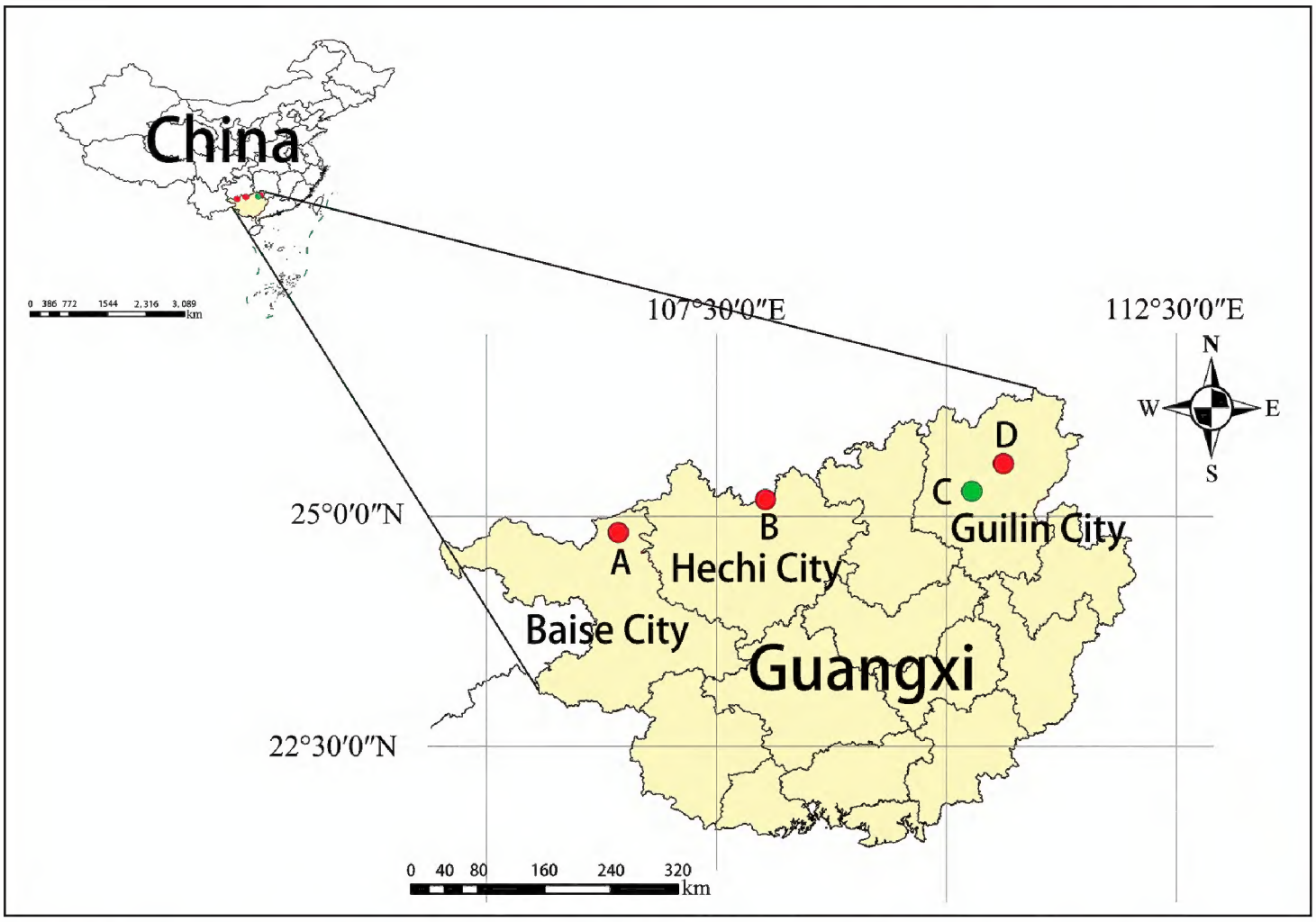

Figure 1. The distributions of the four novel *Tyrannochthonius* species in Guangxi, China **A** *Tyrannochthonius yanwuensis* sp. nov. **B** *Tyrannochthonius tiani* sp. nov. **C** *Tyrannochthonius chixingi* Gao, Wynne & Zhang, 2018 **D** *Tyrannochthonius rudongyanensis* sp. nov.

Results

Taxonomic section

Family Chthoniidae Daday, 1889
Subfamily Chthoniinae Daday, 1889
Tribe Tyrannochthoniini Chamberlin, 1962

Genus *Tyrannochthonius* Chamberlin, 1929

Type species. *Chthonius terribilis* With, 1906, by original designation.

***Tyrannochthonius rudongyanensis* sp. nov.**
https://zoobank.org/02C48AA3-C896-4DCF-9D6A-30C7616EF12F
Figs 2–5
Chinese name. 乳洞岩暴伪蝎

Type material. ***Holotype*** • ♂ (Ps.-MHBU-GX2019101001): China, Guangxi, Guilin City, Xingan County, Rudongyan Cave [25.574192°N, 110.620256°E], 240 m a.s.l.,

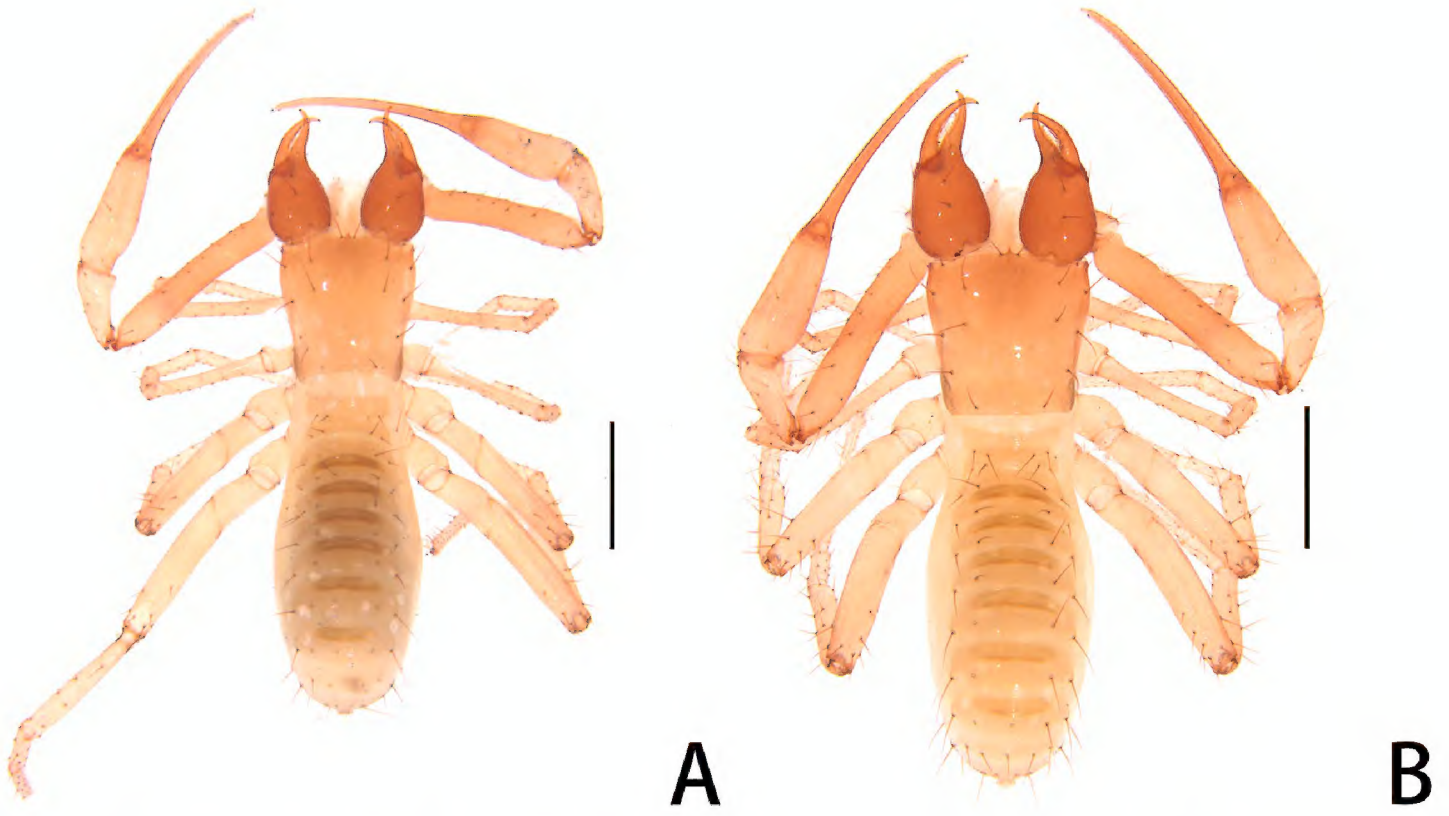

Figure 2. *Tyrannochthonius rudongyanensis* sp. nov. **A** holotype male (dorsal view) **B** paratype female (dorsal view). Scale bar: 0.50 mm.

10 October 2019, Zegang Feng & Lingchen Zhao leg. ***Paratypes*** • 2 ♀ (Ps.-MHBU-GX2019101002–03) all with the same data as the holotype • 3 ♀ (Ps.-MHBU-GX2023020401–03), Rudongyan Cave [25.570469°N, 110.627489°E], 213 m a.s.l., 04 February 2023, Xiangbo Guo, Jianzhou Sun, Tao Zheng & Songtao Shi leg.

Etymology. Named after the type locality, Rudongyan Cave.

Diagnosis. (♂♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome distinctly pointed, triangular; posterior margin of carapace with 2 setae; tergites I–IV each with four setae. Pedipalps slender, femur 6.29 (♂), 6.20–7.33 (♀) times longer than broad, length 0.88 (♂), 0.88–0.93 (♀); chela 7.23 (♂), 6.50–6.73 (♀) times longer than broad, length 1.23 (♂), 1.20–1.30 (♀); both chelal fingers with intercalary teeth; *sb* closer to *b* than *st*.

Description. Adult male (Figs 2–4).

Color generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

Cephalothorax (Figs 3D, 4D): carapace nearly subquadrate, 1.00 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome triangular, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to the setae of ocular row, third pair situated lateral to the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2

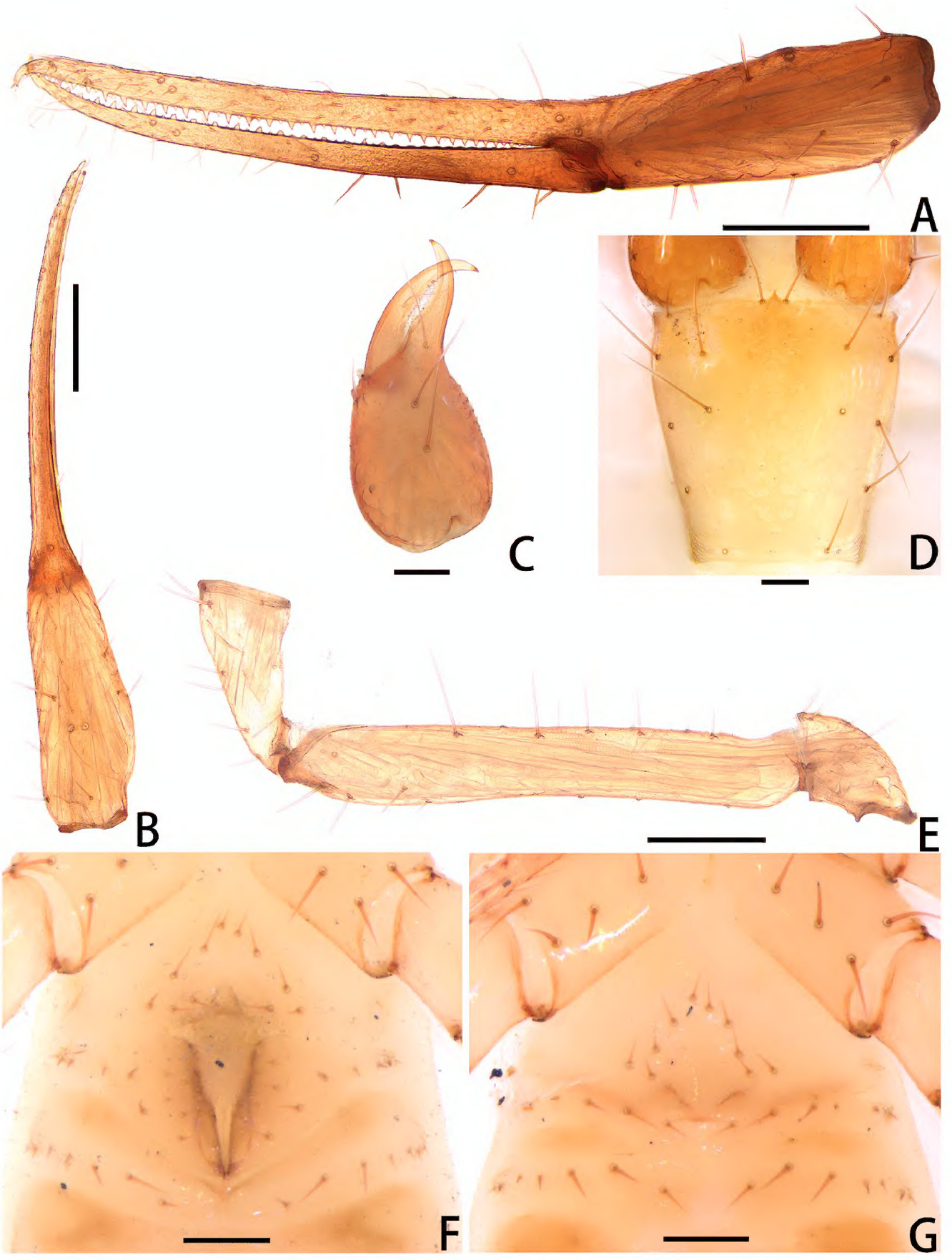

Figure 3. *Tyrannochthonius rudongyanensis* sp. nov., male (**A–F**), female (**G**): **A** left chela (lateral view) **B** left chela (dorsal view) **C** left chelicera (dorsal view) **D** carapace (dorsal view) **E** left pedipalp (minus chela, dorsal view) **F** male genital area (ventral view) **G** female genital area (ventral view). Scale bars: 0.20 mm (**A, B, E**); 0.10 mm (**C, D, F, G**).

length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 12–13 terminally indented coxal spines on each side, set as an oblique and arched row, central spines slightly longer than the others (Fig. 4F); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

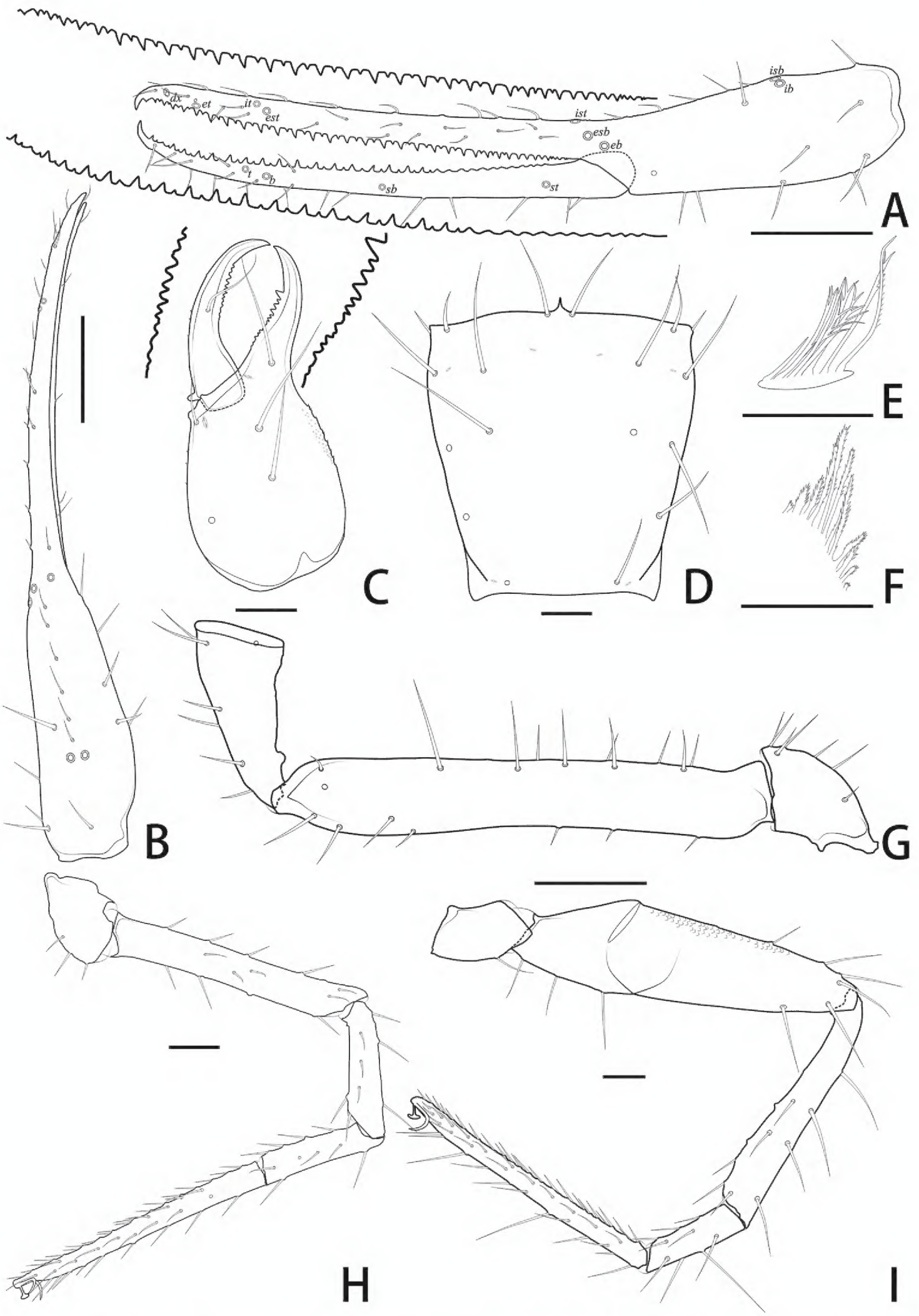

Figure 4. *Tyrannochthonius rudongyanensis* sp. nov., male: **A** left chela (lateral view), with details of teeth and trichobothrial pattern **B** left chela (dorsal view) **C** Left chelicera (dorsal view), with details of teeth **D** carapace (dorsal view) **E** rallum **F** coxal spines on coxae II (ventral view) **G** left pedipalp (minus chela, dorsal view) **H** leg I (lateral view) **I** leg IV (lateral view). Scale bars: 0.20 mm (**A, B, G**); 0.10 mm (**C–F, H, I**).

Chelicera (Figs 3C, 4C): almost as long as carapace, 2.04 times as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 14 teeth, distal one largest; movable finger with 13 contiguous small teeth; galea completely vestigial (Fig. 4C). Serrula exterior with 22 and serrula interior with 15 blades. Rallum with eight blades, the distal one longest, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 4E).

Pedipalp (Figs 3A, B, E, 4A, B, G): trochanter 1.79, femur 6.29, patella 2.13, chela 7.23, hand 2.71 times as long as broad; femur 2.59 times as long as patella; movable chelal finger 1.72 times as long as hand and 0.64 times as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, *ib* and *isb* situated close together, submedially on dorsum of chelal hand; *eb*, *esb* and *ist* at base of fixed chelal finger; *esb* slightly distal *eb* and *ist* slightly distal to *esb*; *it* slightly distal to *est*, situated subdistally; *et* slightly near to tip of fixed chelal finger, slightly close to chelal teeth; *dx* situated distal to *et*; *sb* slightly closer to *b* than to *st*; *b* and *t* situated subdistally, *t* slightly distal to *it* and distal to *b*; *est* situated proximal to *b* and close to *it* (Figs 3A, 4A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 3B, 4B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 32 well-spaced, strongly pointed teeth and 28 intercalary microdenticles; movable finger with 18 well-spaced, strongly pointed teeth, plus 18 intercalary microdenticles and 11 vestigial, rounded and contiguous basal teeth.

Opisthosoma: generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4: 4: 4: 4: 4: 4: 4: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 12: 9: 7: 7: 7: 7: 7: -: 2. Genital region: sternite II with 11 setae scattered on median area, genital opening slit-like, sternite III with a row of 16 setae (Fig. 3F).

Legs (Fig. 4H–I): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.89 times as long as patella; tarsus 2.21 times as long as tibia. Leg IV: femoropatella 4.00 times as long as deep; tibia 5.90 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.57 times as long as deep (TS = 0.40), telotarsus 13.00 times as long as deep and 2.60 times as long as basitarsus (TS = 0.38). Setae of leg I (trochanter to tibia) 3: 12: 8: 10, setae of leg IV (trochanter to basitarsus) 1: 3: 6: 11: 9. Arolium not divided, slightly shorter than the simple claws.

Adult females (paratypes) (Figs 2B, 3G). Mostly same as males; tergal chaetotaxy I–XII: 4: 4: 4: 4: 4: 4: 4: 4–5: 4–5: 4–5: T2T: 0; sternal chaetotaxy IV–XII: 12–14: 10: 9–10: 9: 9: 8–10: 7: -: 2. Genital region: sternite II with 9–10 setae scattered on median area, sternite III with a row of six setae.

Dimensions (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). **Male:** body length 1.88. Pedipalps: trochanter 0.25/0.14 (1.79), femur 0.88/0.14 (6.29), patella 0.34/0.16 (2.13), chela 1.23/0.17 (7.23), hand 0.46/0.17

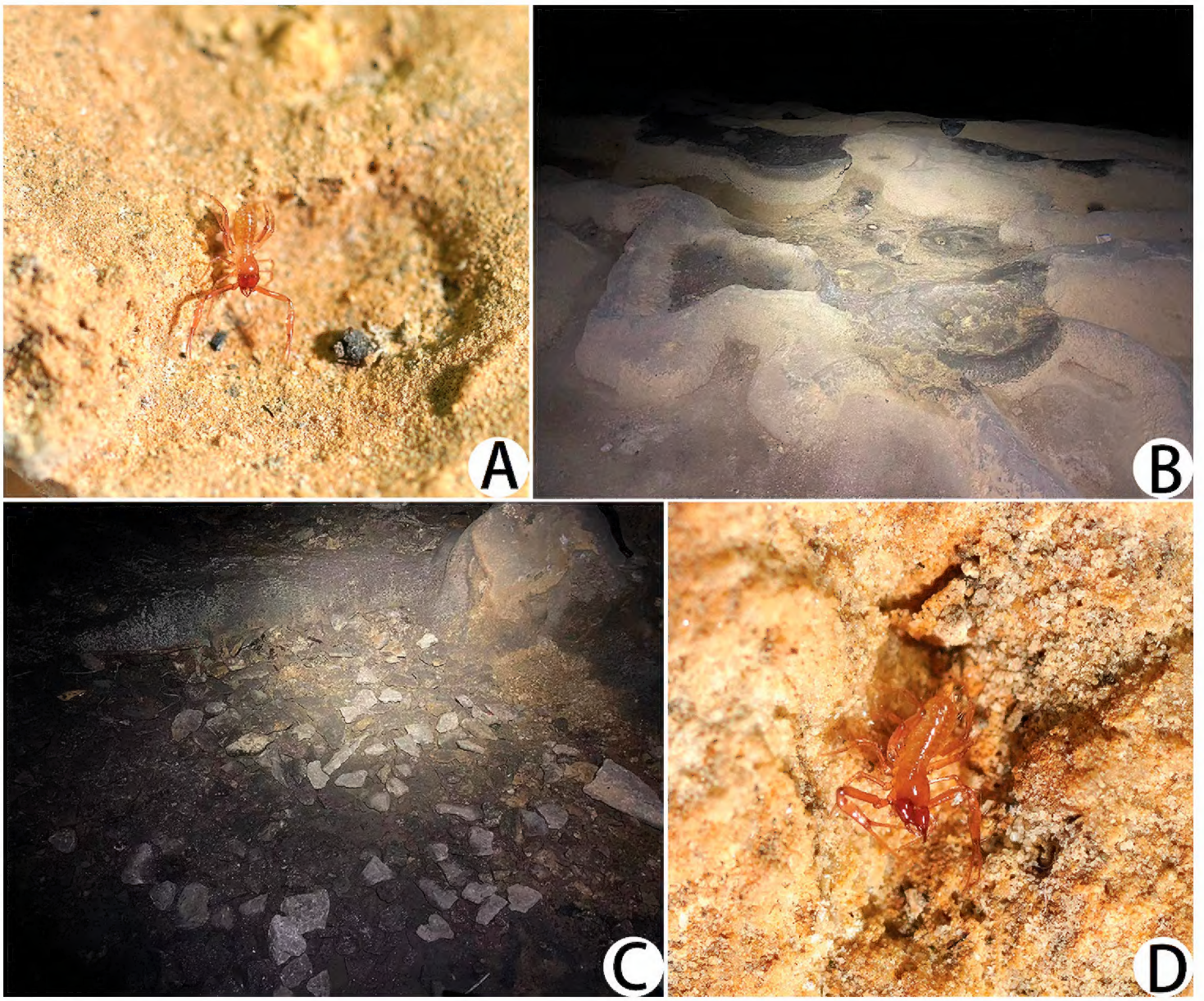

Figure 5. Rudongyan Cave, type locality of *Tyrannochthonius rudongyanensis* sp. nov., **A, D** live female *T. rudongyanensis* sp. nov. in its natural environment **B, C** areas where *T. rudongyanensis* sp. nov. specimens were collected.

(2.71), movable chelal finger length 0.79. Chelicera 0.49/0.24 (2.04), movable finger length 0.28. Carapace 0.54/0.54 (1.00). Leg I: trochanter 0.16/0.12 (1.33), femur 0.51/0.07 (7.29), patella 0.27/0.07 (3.86), tibia 0.24/0.06 (4.00), tarsus 0.53/0.05 (10.06). Leg IV: trochanter 0.23/0.14 (1.64), femoropatella 0.84/0.21 (4.00), tibia 0.59/0.10 (5.90), basitarsus 0.25/0.07 (3.57), telotarsus 0.65/0.05 (13.00).

Females: body length 1.73–1.84. Pedipalps: trochanter 0.25–0.27/0.15–0.16 (1.67–1.69), femur 0.88–0.93/0.12–0.15 (6.20–7.33), patella 0.34–0.37/0.15–0.18 (2.05–2.27), chela 1.20–1.30/0.18–0.20 (6.50–6.73), hand 0.46–0.50/0.18–0.20 (2.50–2.58), movable chelal finger length 0.77–0.83. Chelicera 0.54–0.61/0.25–0.27 (2.16–2.26), movable finger length 0.27–0.31. Carapace 0.55–0.58/0.54–0.58 (1.00–1.05). Leg I: trochanter 0.16–0.17/0.10–0.13 (1.31–1.60), femur 0.51–0.53/0.07–0.08 (6.50–7.57), patella 0.27–0.30/0.07 (3.86–4.29), tibia 0.23–0.25/0.06 (3.83–4.17), tarsus 0.53–0.56/0.05 (10.60–11.20). Leg IV: trochanter 0.20–0.24/0.11–0.16 (1.44–1.82), femoropatella 0.79–0.87/0.21 (3.36–3.76), tibia 0.56–0.60/0.09–0.10 (5.80–6.22), basitarsus 0.23–0.25/0.07–0.08 (3.00–3.29), telotarsus 0.62–0.67/0.05 (12.40–13.40).

Ecology. All the specimens were collected under clod and rocks inside the cave (Fig. 5).

Distribution. Known only from the type locality (Guangxi Zhuang Autonomous Region, China).

***Tyrannochthonius tiani* sp. nov.**

https://zoobank.org/421F49B9-E565-41C7-B53C-2C908511F165

Figs 6–8

Chinese name. 田氏暴伪蝎

Type material. ***Holotype*** • ♀ (Ps.-MHBU-GX2023120801): China, Guangxi, Hechi City, Huanjiang County, The Mulun National Nature Reserve, Ganxiao Cave [25.18312°N, 108.03124°E], 695 m a.s.l., 08 December 2023, Mingyi Tian leg.

Etymology. This species is named for Prof Mingyi Tian, who participated in field work and collected the holotype specimen.

Diagnosis. (♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome distinctly triangular; posterior margin of carapace with two setae; tergites I–IV each with four setae. Pedipalps slender, femur 9.43 times longer than broad (length 1.32); chela 9.42 times longer than broad (length 1.79); both chelal fingers without intercalary teeth, and teeth with strongly heterodentate; *sb* slightly closer to *b* than to *st*.

Description. Adult female (Figs 6–8).

Color generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

Cephalothorax (Figs 7E, 8D): carapace nearly subquadrate, 1.00 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome triangular, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to the setae of ocular row, third pair situated lateral to the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 10–11 terminally indented coxal spines on each side, set as an oblique and arched row, central spines slightly longer than the others (Fig. 8F); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

Chelicera (Figs 7D, 8C): almost as long as carapace, 2.58 times as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 18 teeth, distal one largest; movable finger with 11 contiguous small teeth; galea completely vestigial (Fig. 8C).

Figure 6. *Tyrannochthonius tiani* sp. nov., holotype female (dorsal view). Scale bar: 0.50 mm.

Serrula exterior with 19 and serrula interior with 16 blades. Rallum with eight blades, the distal one longest, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 8E).

Pedipalp (Figs 7A, B, E, 8A, B, G): trochanter 1.88, femur 9.43, patella 3.53, chela 9.42, hand 2.79 times as long as broad; femur 2.20 times as long as patella; movable chelal finger 2.34 times as long as hand and 0.69 times as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, *ib* and *isb* situated close together, submedially on dorsum of chelal hand; *eb*, *esb* and *ist* at base of fixed chelal finger; *esb* slightly distal *eb* and *ist* slightly distal to *esb*; *it* slightly distal to *est*, situated subdistally; *et* slightly near to tip of fixed chelal finger, slightly close to chelal teeth; *dx* situated distal to *et*; *sb* slightly closer to *b* than to *st*; *b* and *t* situated subdistally, *t* slightly distal to *it* and distal to *b*; *est* situated proximal to *b* and close to *it* (Figs 7A, 8A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 7B, 8B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 41 well-spaced, strongly pointed teeth; movable finger with 32 well-spaced, strongly pointed teeth, plus five vestigial, rounded and contiguous basal teeth.

Opisthosoma: generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4: 4: 4: 4: 4: 4:

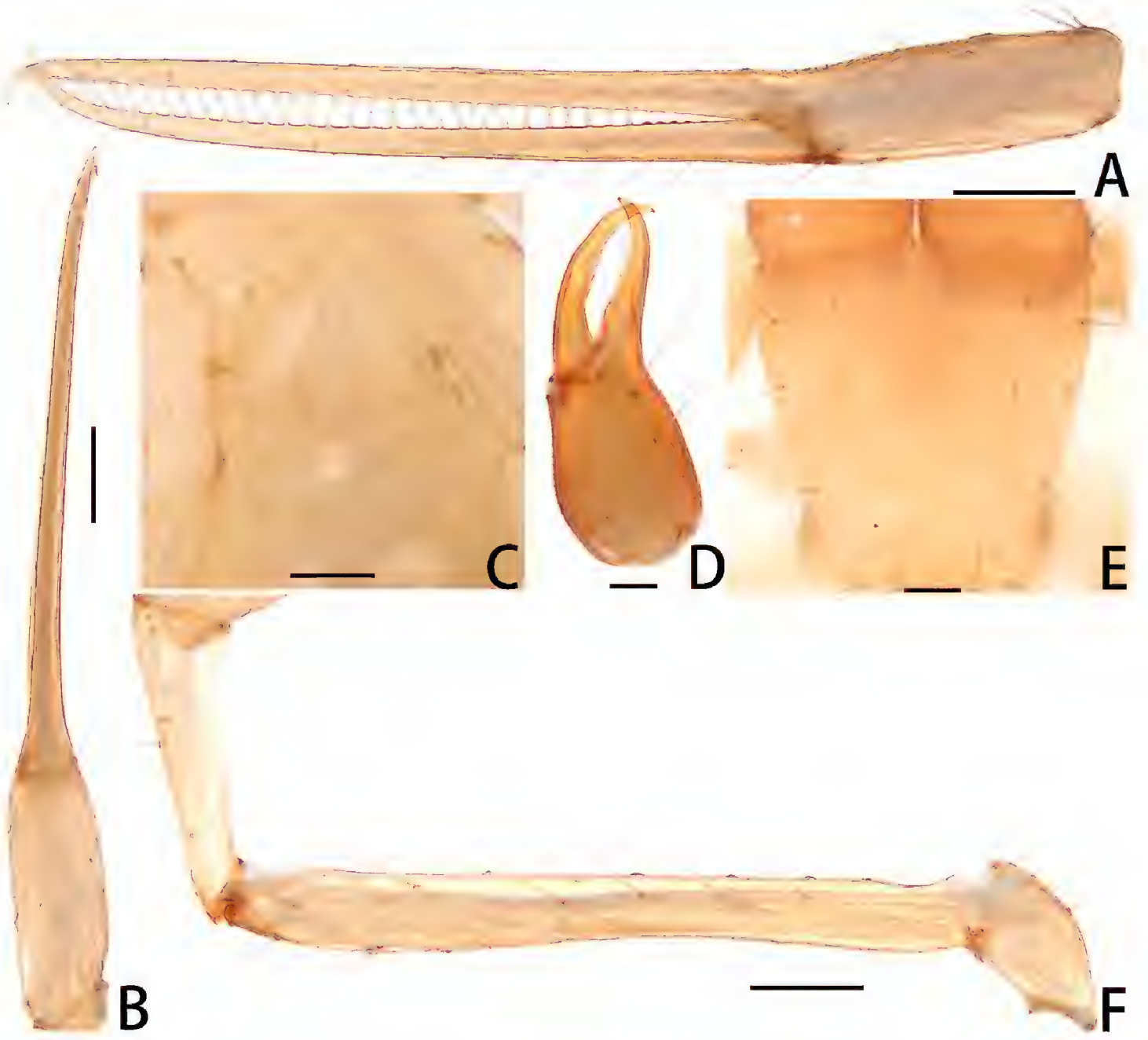

Figure 7. *Tyrannochthonius tiani* sp. nov., holotype female: **A** left chela (lateral view) **B** left chela (dorsal view) **C** female genital area (ventral view) **D** left chelicera (dorsal view) **E** carapace (dorsal view) **F** left pedipalp (minus chela, dorsal view). Scale bars: 0.20 mm (**A, B, F**); 0.10 mm (**C–E**).

5: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 10: 8: 8: 9: 9: 9: 9: -: 2. Genital region: sternite II with ten setae scattered on median area, sternite III with a row of 12 setae (Fig. 7C).

Legs (Fig. 8H–I): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.95 times as long as patella; tarsus 2.24 times as long as tibia. Leg IV: femoropatella 4.86 times as long as deep; tibia 7.44 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 4.00 times as long as deep (TS = 0.30), telotarsus 17.20 times as long as deep and 2.68 times as long as basitarsus (TS = 0.34). Setae of leg I (trochanter to tibia) 3: 16: 13: 11, setae of leg IV (trochanter to basitarsus) 4: 4: 5: 13: 10. Arolium not divided, slightly shorter than the simple claws.

Dimensions (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). **Female:** body length 1.60. Pedipalps: trochanter 0.32/0.17 (1.88), femur 1.32/0.14 (9.43), patella 0.60/0.17 (3.53), chela 1.79/0.19 (9.42), hand 0.53/0.19 (2.79), movable chelal finger length 1.24. Chelicera 0.75/0.29 (2.58), movable finger

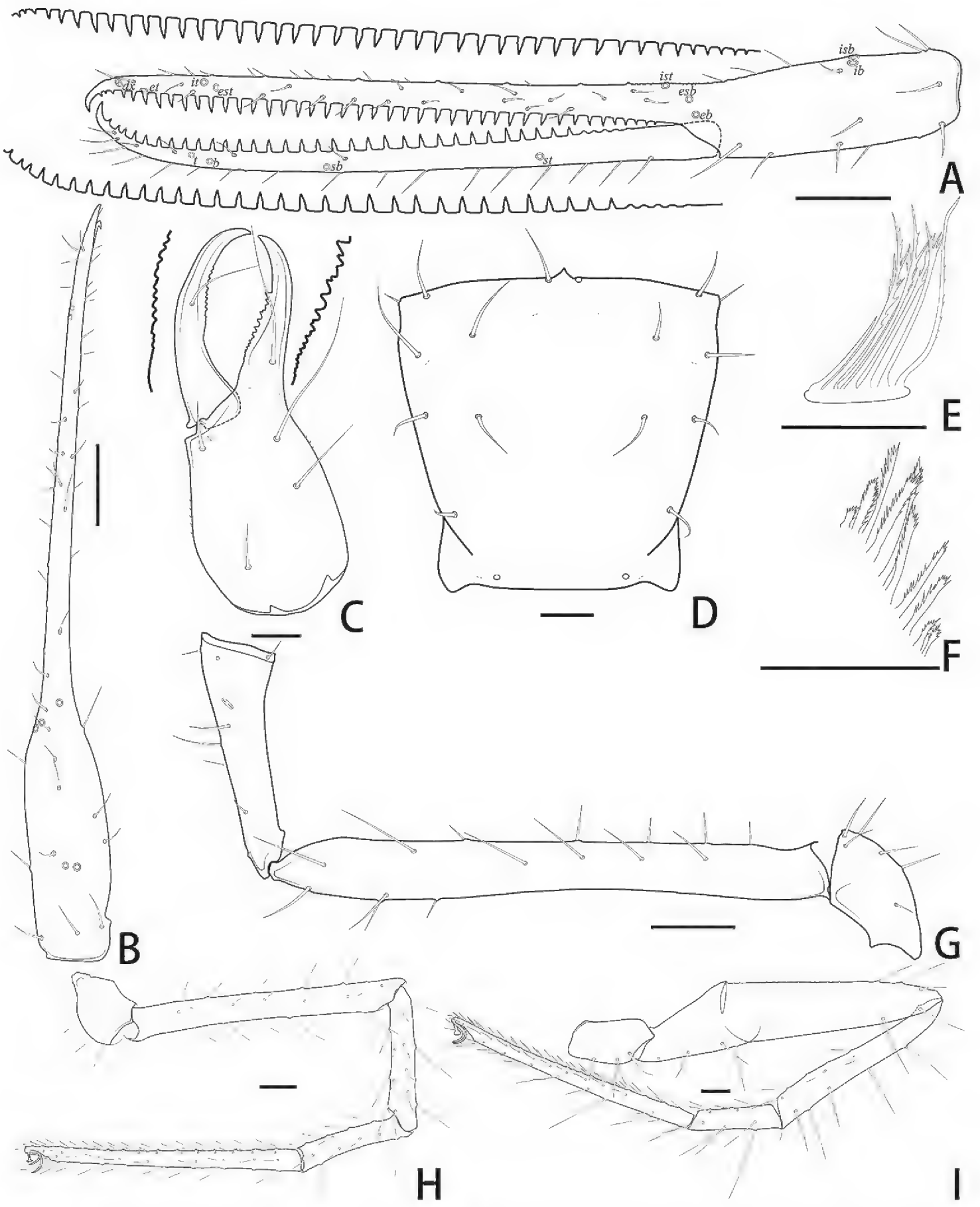

Figure 8. *Tyrannochthonius tiani* sp. nov., male: **A** left chela (lateral view), with details of teeth and trichobothrial pattern **B** left chela (dorsal view) **C** left chelicera (dorsal view), with details of teeth **D** carapace (dorsal view) **E** rallum **F** coxal spines on coxae II (ventral view) **G** left pedipalp (minus chela, dorsal view) **H** leg I (lateral view) **I** Leg IV (lateral view). Scale bars: 0.20 mm (**A, B, G**); 0.10 mm (**C–F, H, I**).

length 0.41. Carapace 0.60/0.60 (1.00). Leg I: trochanter 0.17/0.14 (1.21), femur 0.74/0.09 (8.22), patella 0.38/0.07 (5.43), tibia 0.33/0.06 (5.50), tarsus 0.74/0.06 (12.33). Leg IV: trochanter 0.29/0.15 (1.93), femoropatella 1.07/0.22 (4.86), tibia 0.67/0.09 (7.44), basitarsus 0.32/0.08 (4.00), telotarsus 0.86/0.05 (17.20).

Distribution. Known only from the type locality (Guangxi Zhuang Autonomous Region, China).

***Tyrannochthonius yanwuensis* sp. nov.**
https://zoobank.org/EBD1FB4B-BB42-46FE-B171-0058D8485B56
Figs 9–11
Chinese name. 岩屋暴伪蝎

Type material. ***Holotype*** • ♂ (Ps.-MHBU-GX2024042801): China, Guangxi, Baise City, Leye County, Yanwu Cave [24.823900°N, 106.431500°E], 695 m a.s.l., 28 April 2024, Sunbin Huang, Mingzhi Zhao, Yan Li & Rong Chen leg.

Etymology. Named after the type locality, Yanwu Cave.

Diagnosis. (♂) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome distinctly triangular; posterior margin of carapace with two setae; tergites I–IV each with two setae. Pedipalps slender, femur 7.23 times longer than broad (length 0.94); chela 8.73 times longer than broad (length 1.31); both chelal fingers with intercalary teeth, and fixed finger teeth strongly heterodentate, movable finger teeth strongly retrorse; *sb* midway between *st* and *b*.

Description. Adult male (Figs 9–11).

Color generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

Cephalothorax (Figs 10E, 11D): carapace nearly subquadrate, 0.96 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome triangular, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to the setae of ocular row, third pair situated lateral to the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 10–11 terminally indented coxal spines on each side, set as an oblique and arched row, central spines slightly longer than the others (Fig. 11F); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

Chelicera (Figs 10D, 11C): almost as long as carapace, 2.32 times as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 18 teeth, distal one largest; movable finger with 12 contiguous small teeth; galea completely vestigial (Fig. 11C). Serrula exterior with 23 and serrula interior with 16 blades. Rallum with eight blades, the distal one longest, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 11E).

Figure 9. *Tyrannochthonius yanwuensis* sp. nov., holotype male (dorsal view). Scale bar: 0.50 mm.

Pedipalp (Figs 10A, B, E, 11A, B, G): trochanter 1.86, femur 7.23, patella 3.21, chela 8.73, hand 2.67 times as long as broad; femur 2.09 times as long as patella; movable chelal finger 2.22 times as long as hand and 0.68 times as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, *ib* and *isb* situated close together, submedially on dorsum of chelal hand; *eb*, *esb* and *ist* at base of fixed chelal finger; *esb* slightly distal *eb* and *ist* slightly distal to *esb*; *it* slightly distal to *est*, situated subdistally; *et* slightly near to tip of fixed chelal finger, slightly close to chelal teeth; *dx* situated distal to *et*; *sb* midway between *st* and *b*; *b* and *t* situated subdistally,

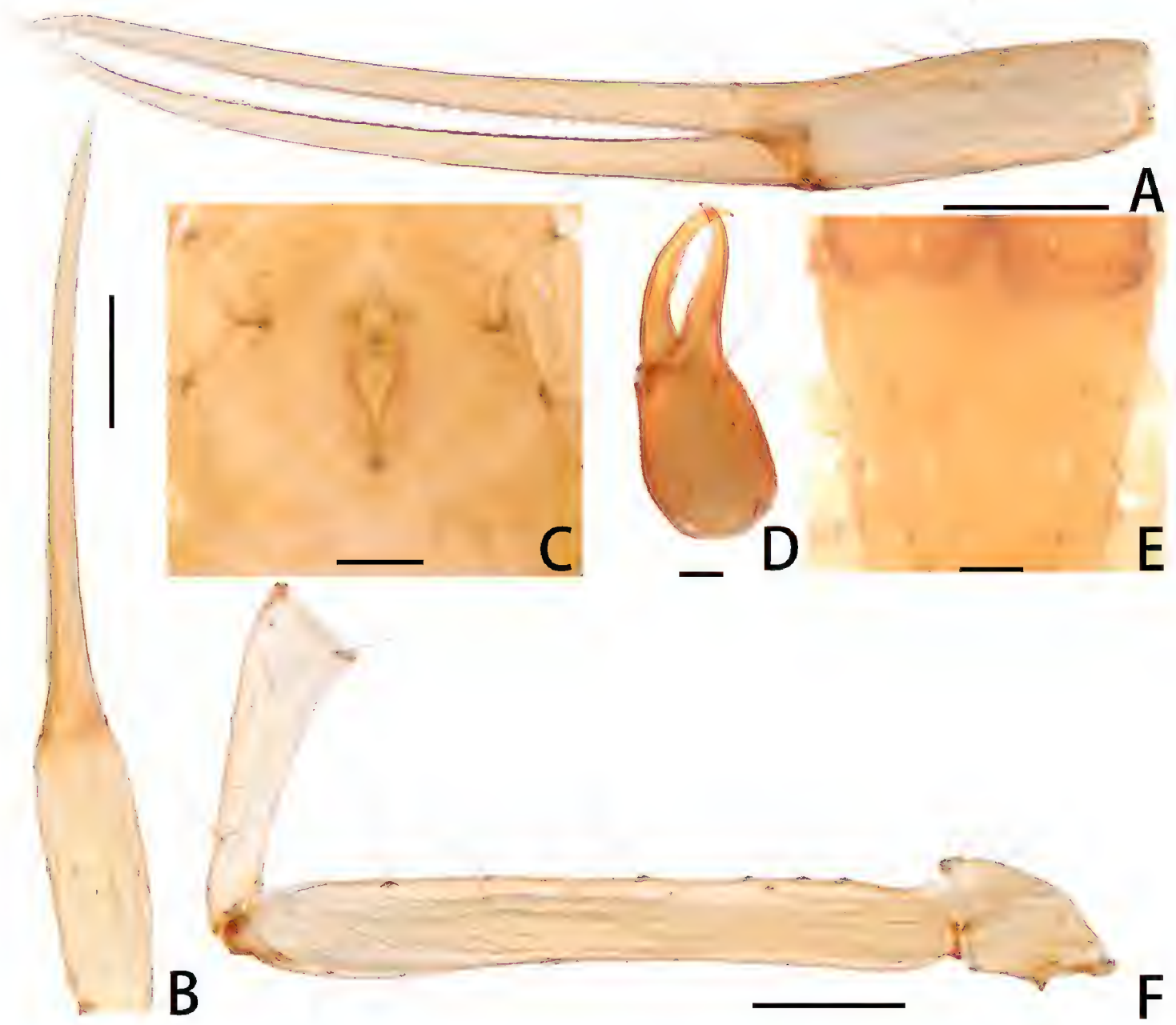

Figure 10. *Tyrannochthonius yanwuensis* sp. nov., holotype male: **A** left chela (lateral view) **B** left chela (dorsal view) **C** male genital area (ventral view) **D** left chelicera (dorsal view) **E** carapace (dorsal view) **F** left pedipalp (minus chela, dorsal view). Scale bars: 0.20 mm (**A, B, F**); 0.10 mm (**C–E**).

t slightly distal to *it* and distal to *b*; *est* situated proximal to *b* and close to *it* (Figs 10A, 11A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 10B, 11B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 45 well-spaced, strongly pointed teeth and six intercalary microdenticles at the terminal; movable finger with 47 well-spaced, pointed retrorse teeth with and seven intercalary microdenticles at the terminal.

Opisthosoma: generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 2: 2: 2: 2: 4: 4: 4: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 10: 8: 8: 7: 7: 8: 7: -: 2. Genital region: sternite II with ten setae scattered on median area, genital opening slit-like, sternite III with a row of 16 setae (Fig. 10C).

Legs (Fig. 11H–I): Leg I: femur 1.90 times as long as patella; tarsus 2.27 times as long as tibia. Leg IV: femoropatella 3.90 times as long as deep; tibia 6.33 times as long

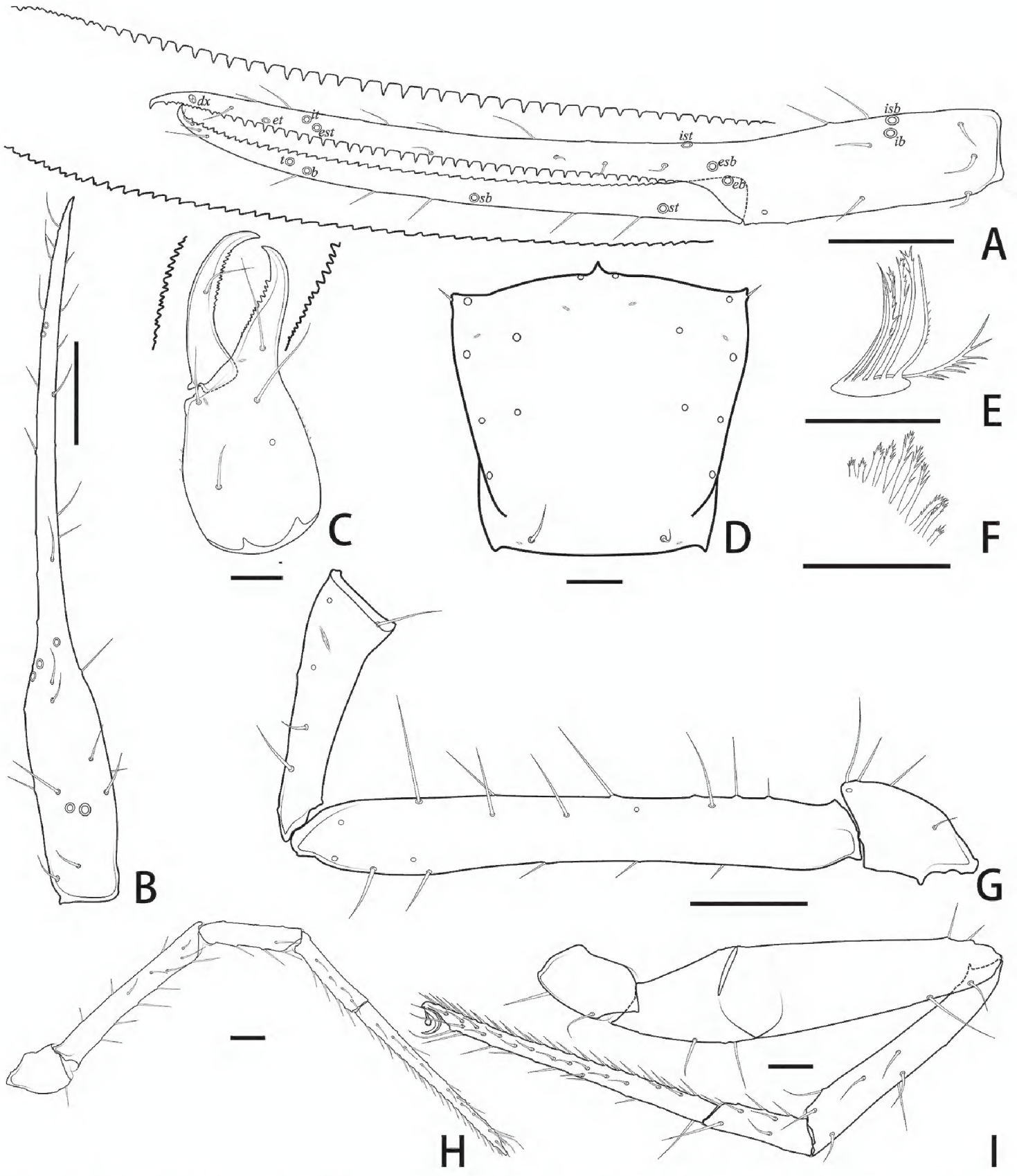

Figure 11. *Tyrannochthonius yanwuensis* sp. nov., male: **A** left chela (lateral view), with details of teeth and trichobothrial pattern **B** left chela (dorsal view) **C** left chelicera (dorsal view), with details of teeth **D** carapace (dorsal view) **E** rallum **F** coxal spines on coxae II (ventral view) **G** left pedipalp (minus chela, dorsal view) **H** leg I (lateral view) **I** leg IV (lateral view). Scale bars: 0.20 mm (**A, B, G**); 0.10 mm (**C–F, H, I**).

as deep; with basal tactile setae on both tarsal segments: basitarsus 4.17 times as long as deep (TS = 0.28), telotarsus 12.80 times as long as deep and 2.56 times as long as basitarsus (TS = 0.28). Setae of leg I (trochanter to tibia) 3: 13: 7: 9, setae of leg IV (trochanter to basitarsus) 2: 3: 5: 8: 9. Arolium not divided, slightly shorter than the simple claws.

Dimensions (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). **Male:** body length 1.36. Pedipalps: trochanter 0.26/0.14 (1.86), femur 0.94/0.13 (7.23), patella 0.45/0.14 (3.21), chela 1.31/0.15 (8.73), hand 0.40/0.15 (2.67), movable chelal finger length 0.89. Chelicera 0.58/0.25 (2.32), movable finger length 0.32. Carapace 0.51/0.53 (0.96). Leg I: trochanter 0.18/0.13 (1.38), femur 0.55/0.07 (7.86), patella 0.29/0.07 (4.14), tibia 0.26/0.05 (5.20), tarsus 0.59/0.05 (11.80). Leg IV: trochanter 0.24/0.16 (1.50), femoropatella 0.82/0.21 (3.90), tibia 0.57/0.09 (6.33), basitarsus 0.25/0.06 (4.17), telotarsus 0.64/0.05 (12.80).

Distribution. Known only from the type locality (Guangxi Zhuang Autonomous Region, China).

Discussion

In China, species of the genus *Tyrannochthonius* were reported exclusively in the southern regions, with the majority of species concentrated in the Yunnan-Guizhou Plateau, while only a few species occur in other regions. Before this study, only one *Tyrannochthonius* species was known from Guangxi; our research has expanded the number of hypogean species to four. The distinctions between these three new species and other known species are as follows:

1. *Tyrannochthonius rudongyanensis* sp. nov. closely resembles *T. multidentatus* Hou, Feng & Zhang, 2023 and *T. antridraconis* Mahnert, 2009 in the absence of eyes or eyespots, the presence of both chelal fingers with intercalary teeth, the presence of four setae on tergites I–IV, and the position of *sb*, which slightly closer to *b* than to *st*, but differs in the following characters: shorter pedipalpal femur (0.88 (♂), 0.88–0.93 (♀) vs 1.00–1.02 (♂), 1.10–1.12 (♀) in *T. multidentatus* and 1.18–1.29 (♂) in *T. antridraconis*), shorter pedipalpal chela (1.23 (♂), 1.20–1.30 (♀) vs. 1.48–1.49 (♂), 1.56–1.59 (♀) in *T. multidentatus* and 1.70–1.76 (♂), 1.68–1.70 (♀) in *T. antridraconis*) and, short and upright teeth (fixed chela finger with longer teeth and movable chela finger with macrodenticles, continuous, markedly retrorse teeth in *T. multidentatus*) (Hou et al. 2023a; Mahnert 2009).

2. *Tyrannochthonius tiani* sp. nov. closely resembles *T. nanxingensis* Hou, Feng & Zhang, 2023 in the absence of intercalary teeth, the presence of four setae on tergites I–III, and the position of *sb*, which is slightly closer to *b* than to *st*, but differs in the following characters: thinner chela (9.42 (♀) times longer than broad vs. 7.12 (♀) times longer than broad in *T. nanxingensis*) and the shape of the chela teeth (movable chela finger with macrodenticles teeth vs. with smaller teeth in *T. nanxingensis*) (Hou et al. 2023a).

3. *Tyrannochthonius yanwuensis* sp. nov. closely resembles *T. akaelus* Mahnert, 2009 by the presence of intercalary teeth on both chela fingers, the presence of two setae on tergites I–II, and the absence of eyes or eyespots, but differs in the following character: the number of setae on tergites III–IV (2:2 vs. 3:4 in *T. akaelus*) (Mahnert 2009).

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